

This is CS50

GETTING INFORMATION
FROM **NOT**
OLIVE TRYING TO
GET A DRINK
FROM A
FIRE HOSE...



2/3

of CS50 students have never taken CS before

what ultimately matters in this course is not so much where
you end up relative to your classmates but where
you end up relative to yourself when you began

Code

Costumes

Sounds



Motion



Looks



Sound



Events



Control



Sensing



Operators



Variables



My Blocks

Motion

move 10 steps

turn 15 degrees

turn 15 degrees

go to random position

go to x: 0 y: 0

glide 1 secs to random position

glide 1 secs to x: 0 y: 0

point in direction 90

point towards mouse-pointer

change x by 10

set x to 0

change y by 10

set y to 0

if on edge, bounce



Sprite

Sprite1

x 0

y 0

Show



Size

100

Direction

90



Stage

Backdrops

1



hello.c — hello [Codespaces] — x +

code.cs50.io Guest

☰

HELLO [CODESPACES]

hello.c

OUTLINE

TIMELINE

hello.c x

```
1 #include <stdio.h>
2
3 int main(void)
4 {
5     printf("hello, world\n");
6 }
```

TERMINAL

\$ make hello



8BB12
D9HXT

4G85



8BB12
D9HXT

4G85

In relay

11,000 test.

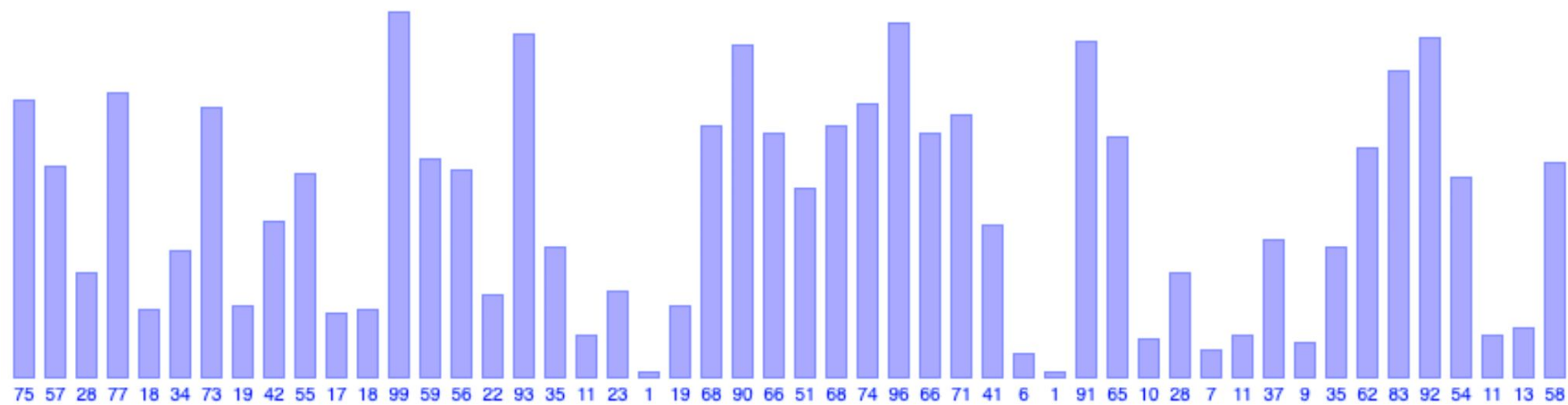
1100 Started Cosine Tapc (Sine check)
1525 Started Multi-Adder Test.

1545

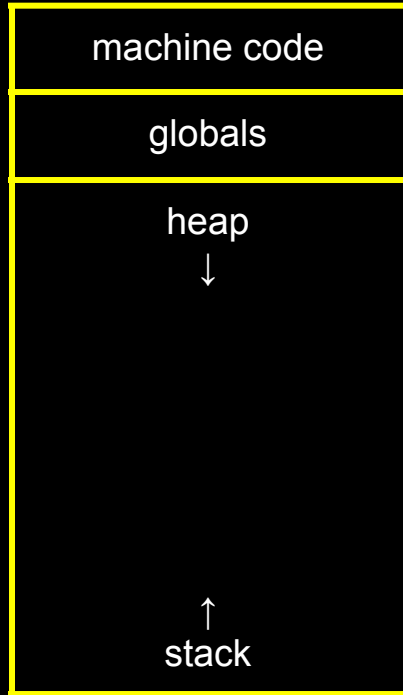


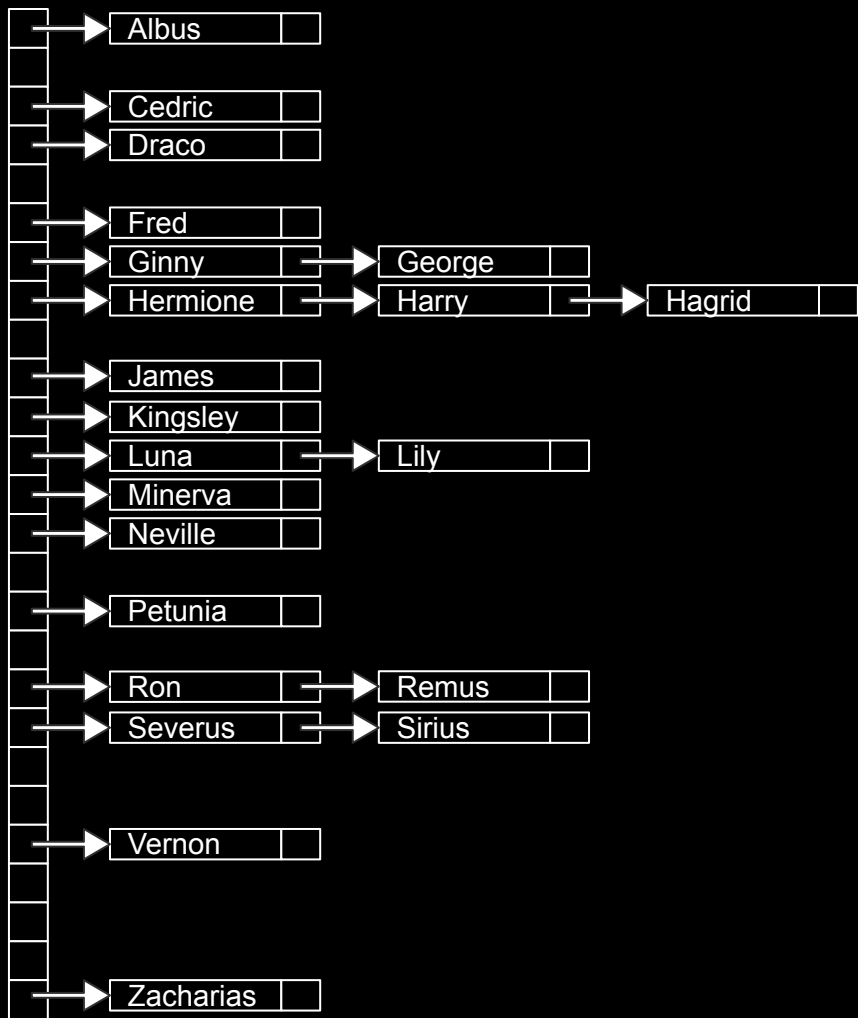
Relay #70 Panel F
(moth) in relay.

First actual case of bug being found.
~~1630~~ 1630 Antangut started.
1700 closed down.









```
#include <stdio.h>
```

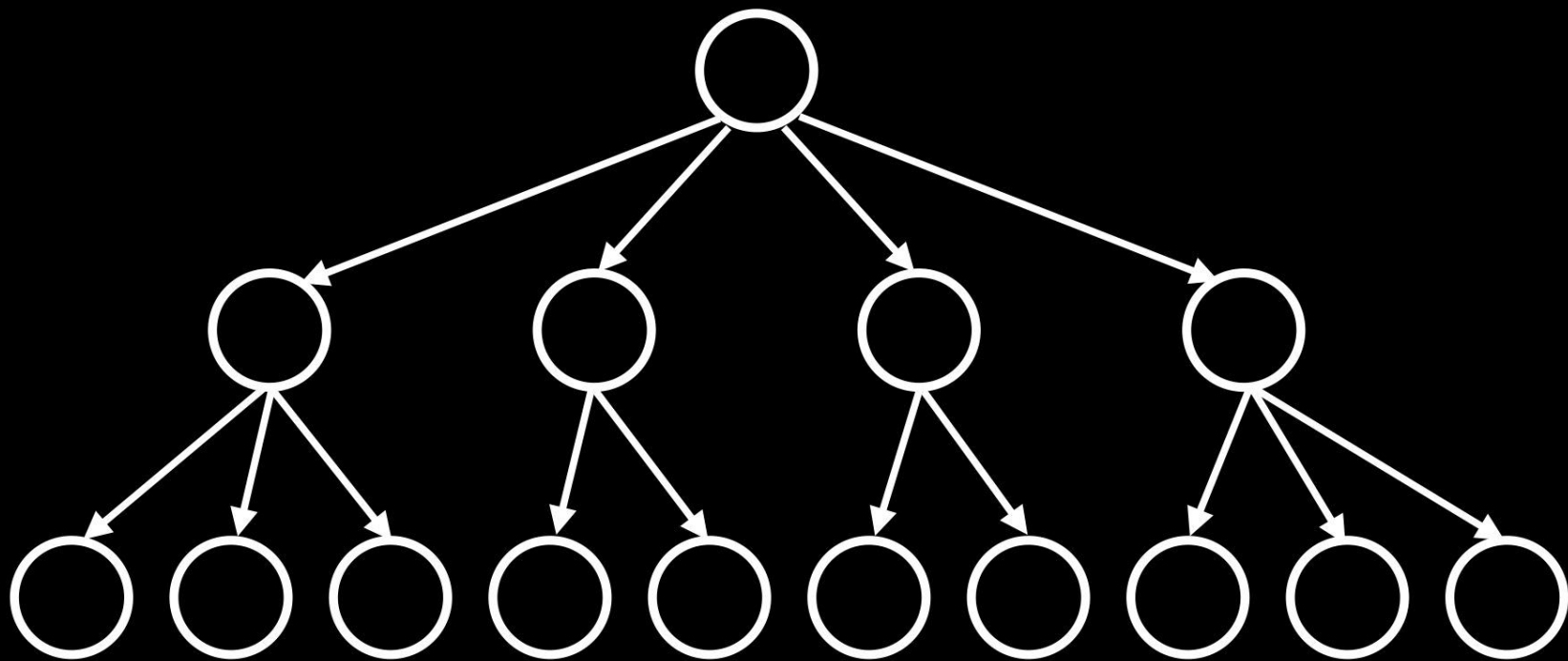
```
int main(void)
```

```
{
```

```
    printf("hello, world\n");
```

```
}
```

```
print("hello, world")
```




```
<!DOCTYPE html>
```

```
<html lang="en">
```

```
  <head>
```

```
    <title>
```

```
      hello, title
```

```
    </title>
```

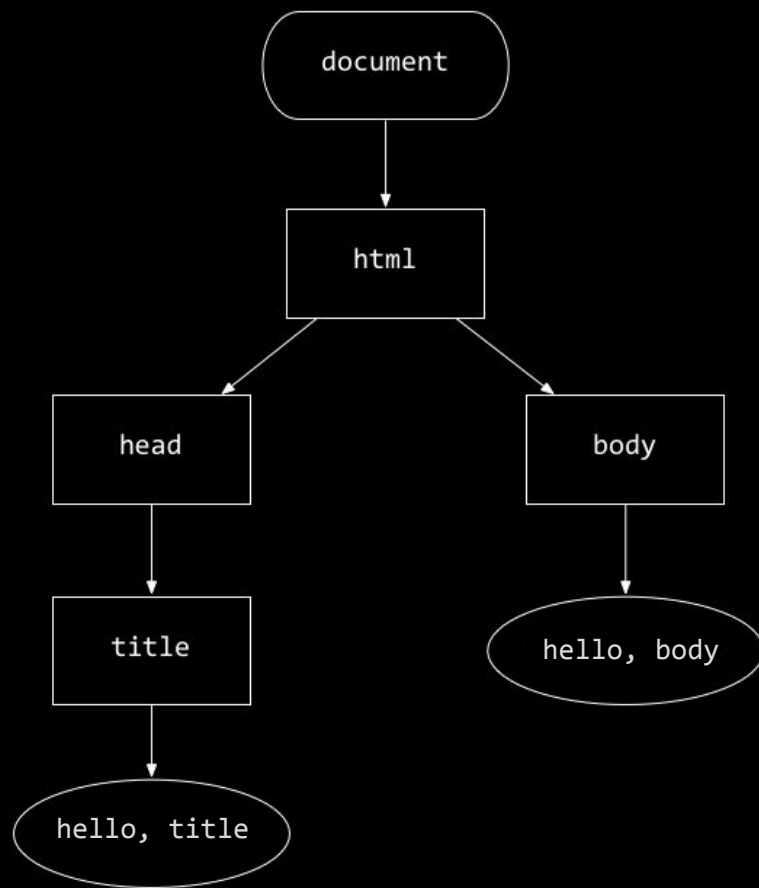
```
  </head>
```

```
  <body>
```

```
    hello, body
```

```
  </body>
```

```
</html>
```





Frosh IMs

Intramural Sports for the class of 2007

Calendar
Champions
FAQ's
Guide to Frosh IMs
Headlines
How to get involved
Photos

Point tallies
Records
Register
Registrants
Rules
Schedules and results
Whom to contact

Headlines

Past headlines

For headlines posted prior to the past seven days, click [here](#).



CS50 Puzzle Day





CS50 Hackathon





THIS IS CS50

IHop

HARVARD

HARVARD
SHUTTLE

36442



CS50 Fair









I took CS50.

I took CS50.

I took CS50.

I took CS50.

I took CS50.

I took CS50.

I took CS50.

I took CS50.

I took CS50.

I took CS50.

I took CS50.

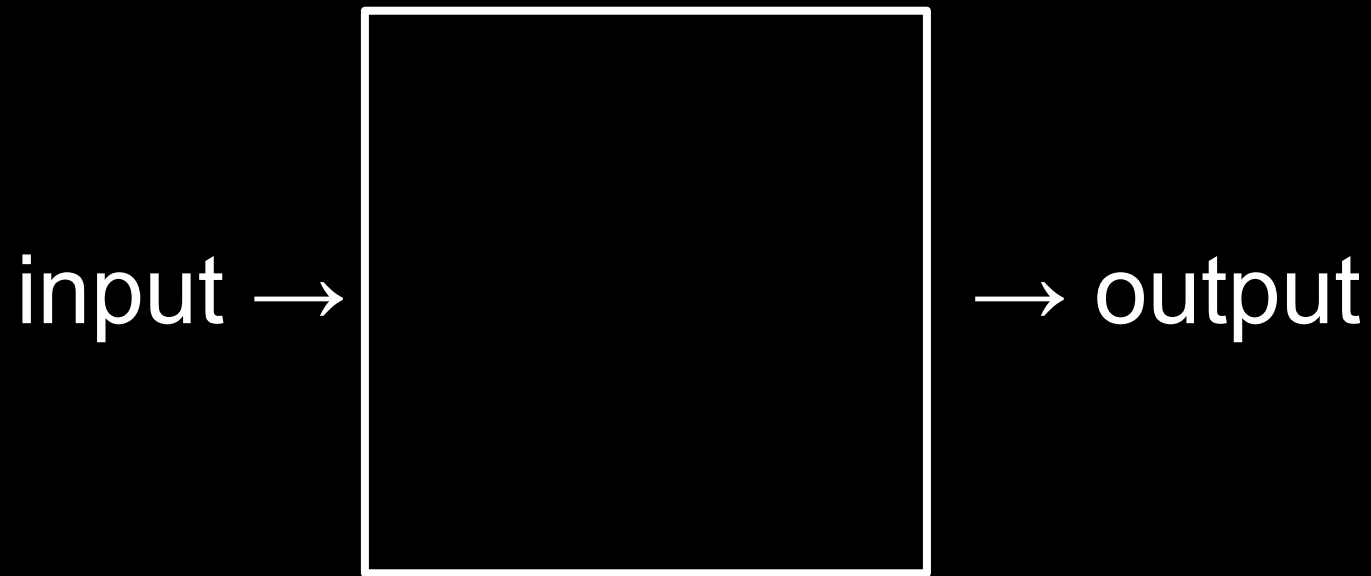
I took CS50.

I took CS50.

computer science

computational thinking

problem solving



representation

unary

base-1

binary

binary digit

bi

t

bit

0



1



This is CS50

base-2

base-10

decimal

123

1

123

10 1

123

100 10 1

123

100 10 1

123

100×1

100 10 1

123

$100 \times 1 + 10 \times 2$

100 10 1

123

100×1 $+$ 10×2 $+$ 1×3

100 10 1

123

100 + 20 + 3

123

100 10 1

#

10^2 10^1 10^0

#

2^2 2^1 2^0

#

4 2 1

#

4 2 1

000

4 2 1

001

4 2 1

010

4 2 1

011

4 2 1

100

4 2 1

101

4 2 1

110

4 2 1

111

4 2 1

000

8 4 2 1

1000

4 2 1

000

byte

00000000

11111111

A

65

01000001

ASCII

0	<u>NUL</u>	16	<u>DLE</u>	32	<u>SP</u>	48	0	64	@	80	P	96	`	112	p
1	<u>SOH</u>	17	<u>DC1</u>	33	!	49	1	65	A	81	Q	97	a	113	q
2	<u>STX</u>	18	<u>DC2</u>	34	"	50	2	66	B	82	R	98	b	114	r
3	<u>ETX</u>	19	<u>DC3</u>	35	#	51	3	67	C	83	S	99	c	115	s
4	<u>EOT</u>	20	<u>DC4</u>	36	\$	52	4	68	D	84	T	100	d	116	t
5	<u>ENQ</u>	21	<u>NAK</u>	37	%	53	5	69	E	85	U	101	e	117	u
6	<u>ACK</u>	22	<u>SYN</u>	38	&	54	6	70	F	86	V	102	f	118	v
7	<u>BEL</u>	23	<u>ETB</u>	39	'	55	7	71	G	87	W	103	g	119	w
8	<u>BS</u>	24	<u>CAN</u>	40	(	56	8	72	H	88	X	104	h	120	x
9	<u>HT</u>	25	<u>EM</u>	41	)	57	9	73	I	89	Y	105	i	121	y
10	<u>LF</u>	26	<u>SUB</u>	42	*	58	:	74	J	90	Z	106	j	122	z
11	<u>VT</u>	27	<u>ESC</u>	43	+	59	;	75	K	91	[	107	k	123	{
12	<u>FF</u>	28	<u>FS</u>	44	,	60	<	76	L	92	\	108	l	124	|
13	<u>CR</u>	29	<u>GS</u>	45	-	61	=	77	M	93	]	109	m	125	}
14	<u>SO</u>	30	<u>RS</u>	46	.	62	>	78	N	94	^	110	n	126	~
15	<u>SI</u>	31	<u>US</u>	47	/	63	?	79	O	95	_	111	o	127	<u>DEL</u>

0	<u>NUL</u>	16	<u>DLE</u>	32	<u>SP</u>	48	0	64	@	80	P	96	`	112	p
1	<u>SOH</u>	17	<u>DC1</u>	33	!	49	1	65	A	81	Q	97	a	113	q
2	<u>STX</u>	18	<u>DC2</u>	34	"	50	2	66	B	82	R	98	b	114	r
3	<u>ETX</u>	19	<u>DC3</u>	35	#	51	3	67	C	83	S	99	c	115	s
4	<u>EOT</u>	20	<u>DC4</u>	36	\$	52	4	68	D	84	T	100	d	116	t
5	<u>ENQ</u>	21	<u>NAK</u>	37	%	53	5	69	E	85	U	101	e	117	u
6	<u>ACK</u>	22	<u>SYN</u>	38	&	54	6	70	F	86	V	102	f	118	v
7	<u>BEL</u>	23	<u>ETB</u>	39	'	55	7	71	G	87	W	103	g	119	w
8	<u>BS</u>	24	<u>CAN</u>	40	(	56	8	72	H	88	X	104	h	120	x
9	<u>HT</u>	25	<u>EM</u>	41	)	57	9	73	I	89	Y	105	i	121	y
10	<u>LF</u>	26	<u>SUB</u>	42	*	58	:	74	J	90	Z	106	j	122	z
11	<u>VT</u>	27	<u>ESC</u>	43	+	59	;	75	K	91	[	107	k	123	{
12	<u>FF</u>	28	<u>FS</u>	44	,	60	<	76	L	92	\	108	l	124	|
13	<u>CR</u>	29	<u>GS</u>	45	-	61	=	77	M	93	]	109	m	125	}
14	<u>SO</u>	30	<u>RS</u>	46	.	62	>	78	N	94	^	110	n	126	~
15	<u>SI</u>	31	<u>US</u>	47	/	63	?	79	O	95	_	111	o	127	<u>DEL</u>

01001000

01001001

00100001

72

73

33

H
72

I
73

33

H
72

I
73

!
33

0	<u>NUL</u>	16	<u>DLE</u>	32	<u>SP</u>	48	0	64	@	80	P	96	`	112	p
1	<u>SOH</u>	17	<u>DC1</u>	33	!	49	1	65	A	81	Q	97	a	113	q
2	<u>STX</u>	18	<u>DC2</u>	34	"	50	2	66	B	82	R	98	b	114	r
3	<u>ETX</u>	19	<u>DC3</u>	35	#	51	3	67	C	83	S	99	c	115	s
4	<u>EOT</u>	20	<u>DC4</u>	36	\$	52	4	68	D	84	T	100	d	116	t
5	<u>ENQ</u>	21	<u>NAK</u>	37	%	53	5	69	E	85	U	101	e	117	u
6	<u>ACK</u>	22	<u>SYN</u>	38	&	54	6	70	F	86	V	102	f	118	v
7	<u>BEL</u>	23	<u>ETB</u>	39	'	55	7	71	G	87	W	103	g	119	w
8	<u>BS</u>	24	<u>CAN</u>	40	(	56	8	72	H	88	X	104	h	120	x
9	<u>HT</u>	25	<u>EM</u>	41	)	57	9	73	I	89	Y	105	i	121	y
10	<u>LF</u>	26	<u>SUB</u>	42	*	58	:	74	J	90	Z	106	j	122	z
11	<u>VT</u>	27	<u>ESC</u>	43	+	59	;	75	K	91	[	107	k	123	{
12	<u>FF</u>	28	<u>FS</u>	44	,	60	<	76	L	92	\	108	l	124	
13	<u>CR</u>	29	<u>GS</u>	45	-	61	=	77	M	93]	109	m	125	}
14	<u>SO</u>	30	<u>RS</u>	46	.	62	>	78	N	94	^	110	n	126	~
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0	<u>NUL</u>	16	<u>DLE</u>	32	<u>SP</u>	48	0	64	@	80	P	96	`	112	p
1	<u>SOH</u>	17	<u>DC1</u>	33	!	49	1	65	A	81	Q	97	a	113	q
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5	<u>ENQ</u>	21	<u>NAK</u>	37	%	53	5	69	E	85	U	101	e	117	u
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7	<u>BEL</u>	23	<u>ETB</u>	39	'	55	7	71	G	87	W	103	g	119	w
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9	<u>HT</u>	25	<u>EM</u>	41)	57	9	73	I	89	Y	105	i	121	y
10	<u>LF</u>	26	<u>SUB</u>	42	*	58	:	74	J	90	Z	106	j	122	z
11	<u>VT</u>	27	<u>ESC</u>	43	+	59	;	75	K	91	[107	k	123	{
12	<u>FF</u>	28	<u>FS</u>	44	,	60	<	76	L	92	\	108	l	124	
13	<u>CR</u>	29	<u>GS</u>	45	-	61	=	77	M	93]	109	m	125	}
14	<u>SO</u>	30	<u>RS</u>	46	.	62	>	78	N	94	^	110	n	126	~
15	<u>SI</u>	31	<u>US</u>	47	/	63	?	79	O	95	_	111	o	127	<u>DEL</u>

~ `	1 !	2 @	3 #	4 \$	5 %	6 ^	7 &	8 *	( (	) )	- _	+ =	← Backspace
Tab ⇐ ⇒	Q	W	E	R	T	Y	U	I	O	P	{ [	} ]	| \ _
Caps Lock ⬆	A	S	D	F	G	H	J	K	L	: ;	" '	Enter ↵	
Shift ⬆	Z	X	C	V	B	N	M	< ,	> .	? /	Shift ⬆		
Ctrl	Win Key	Alt								Alt	Win Key	Menu	Ctrl

à	á	â	ä	æ	ã	å	ā
1	2	3	4	5	6	7	8

a



Search

FAVORITES



SMILEYS & PEOPLE



Unicode

1111000010011111001100010000010

4036991106

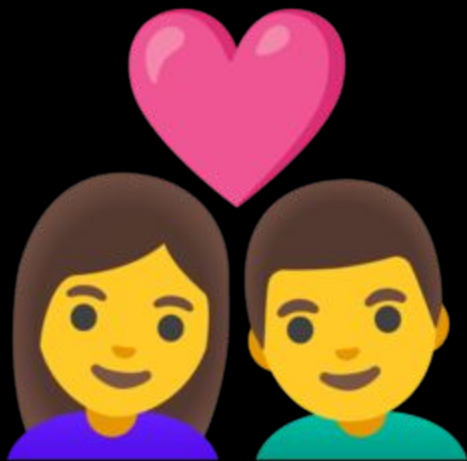


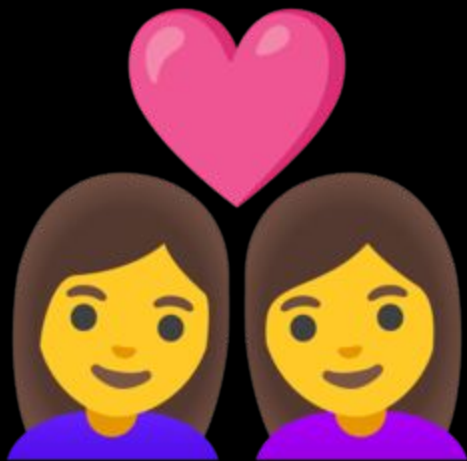


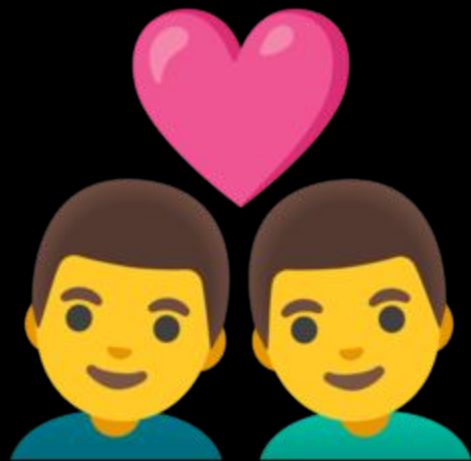












RGB



72 73 33

72

73

33







face-with-tears-of-joy_1f602.png



Search





face-with-tears-of-joy_1f602.png



Search

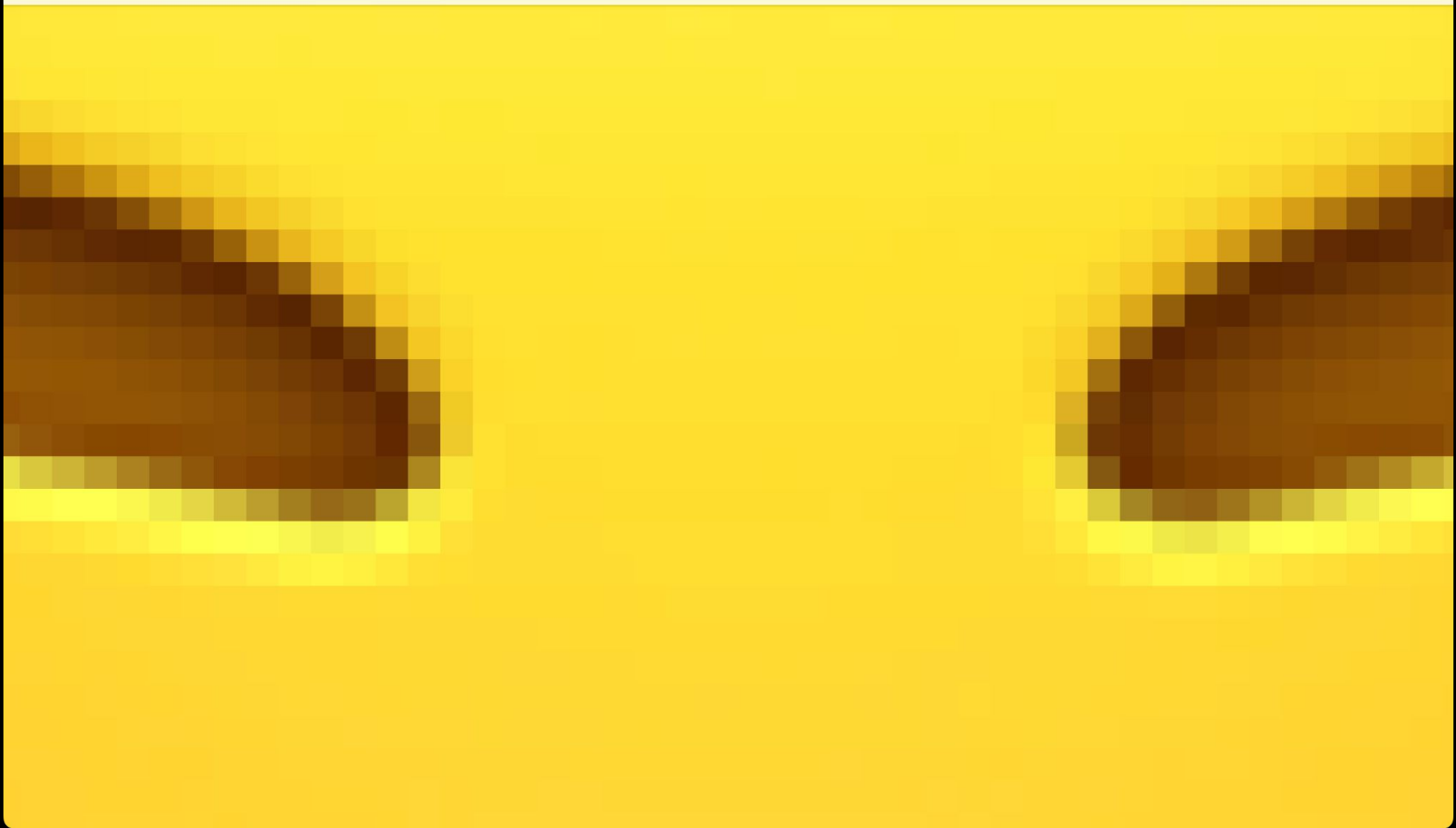




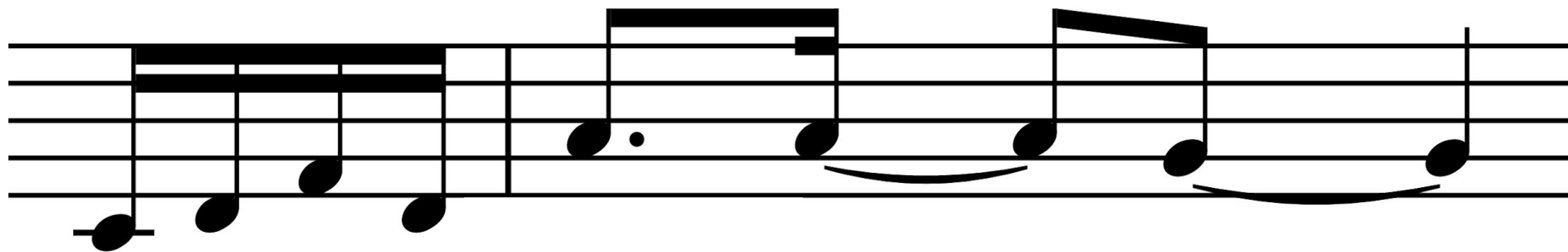
face-with-tears-of-joy_1f602.png

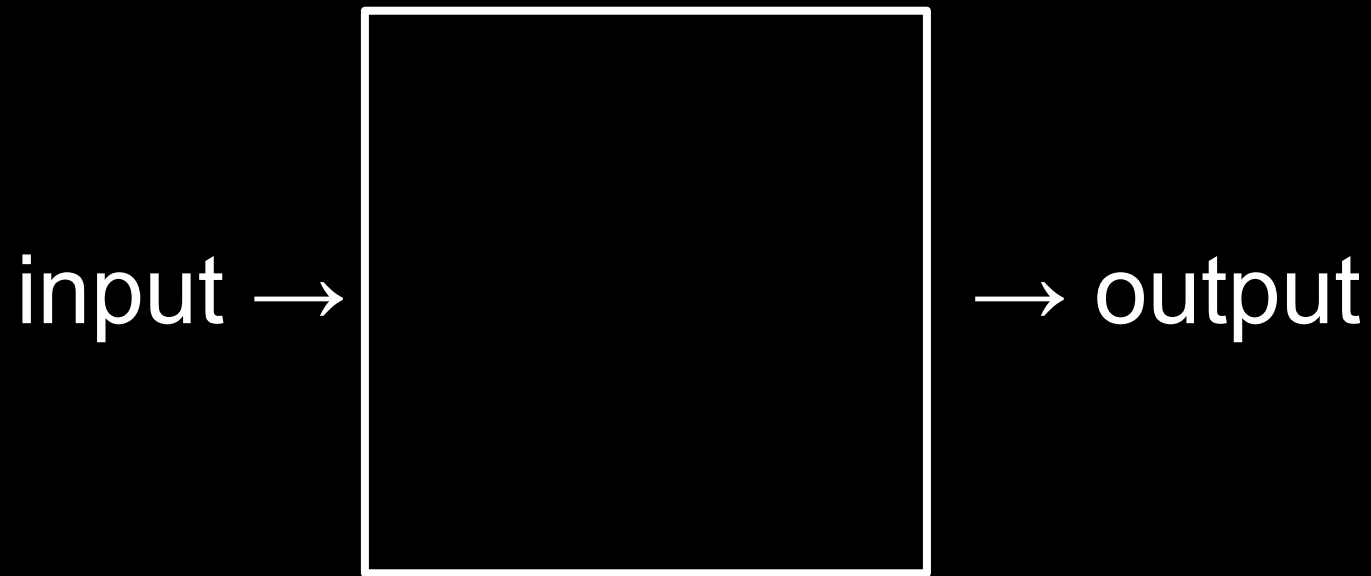


Search

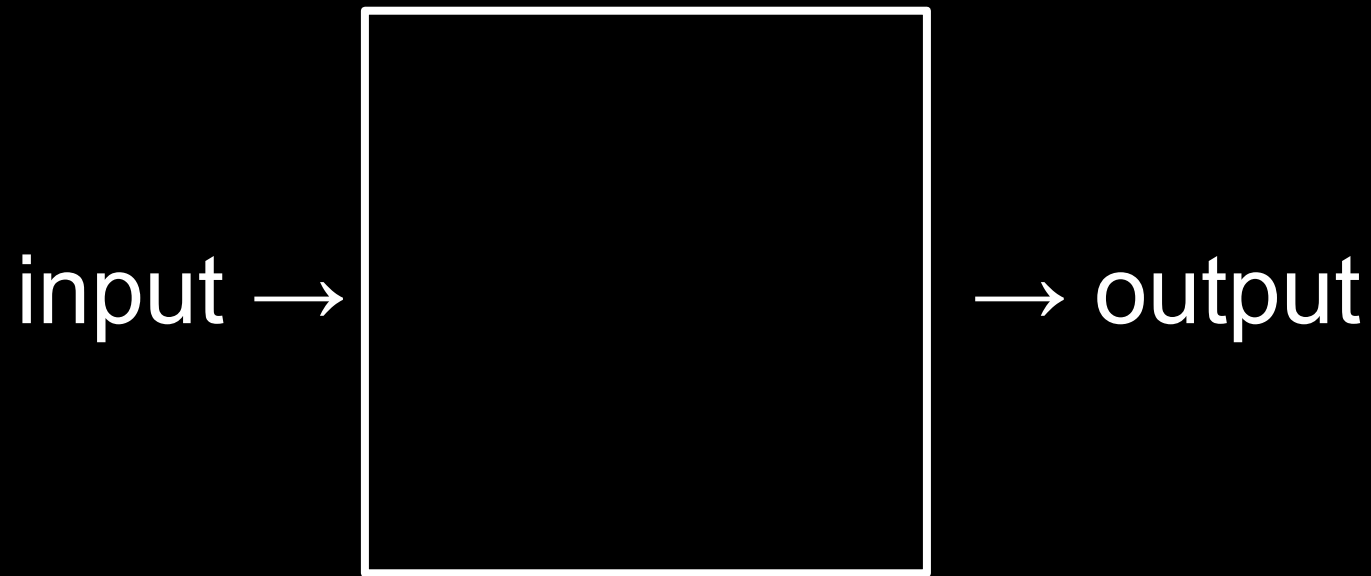








abstraction





algorithm

implementation details



Groups



Contacts

Q Search

A

Albus

C

Cedric

D

Draco

F

Fred

G

George

Ginny

H

Hagrid

Harry

Hermione

J

James

A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
#

< Contacts

Edit



John Harvard



message



call



video



mail



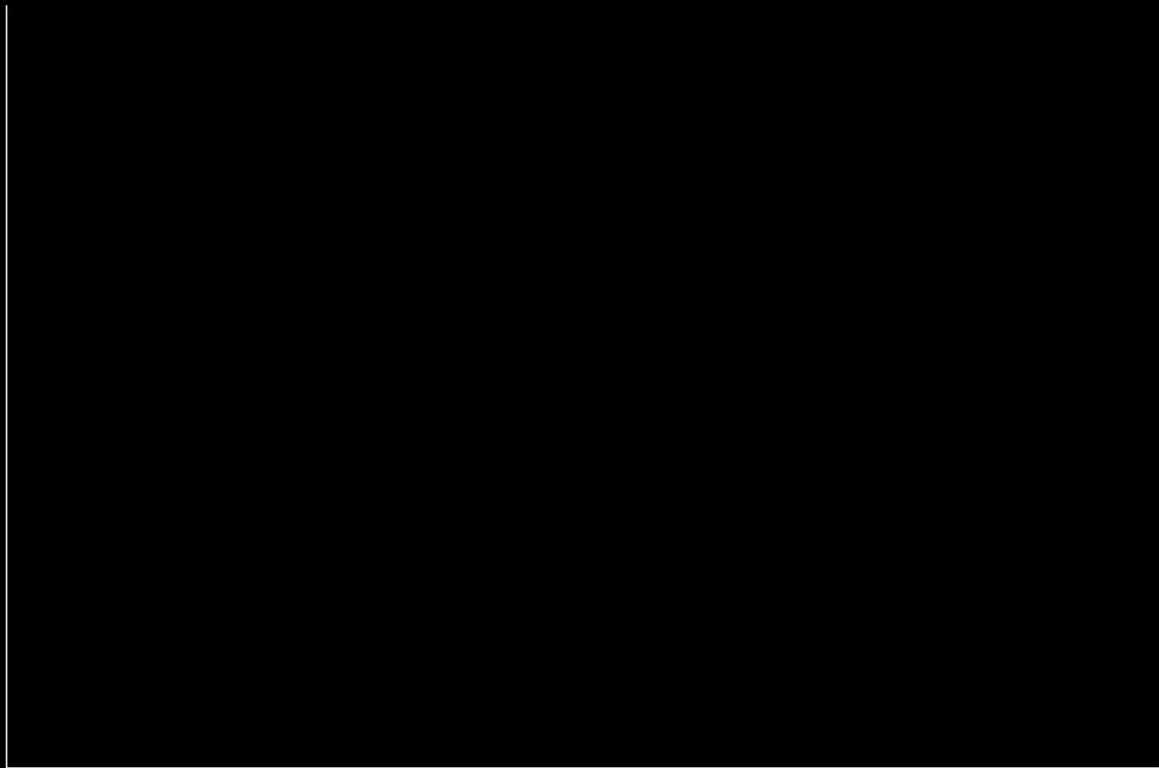
pay

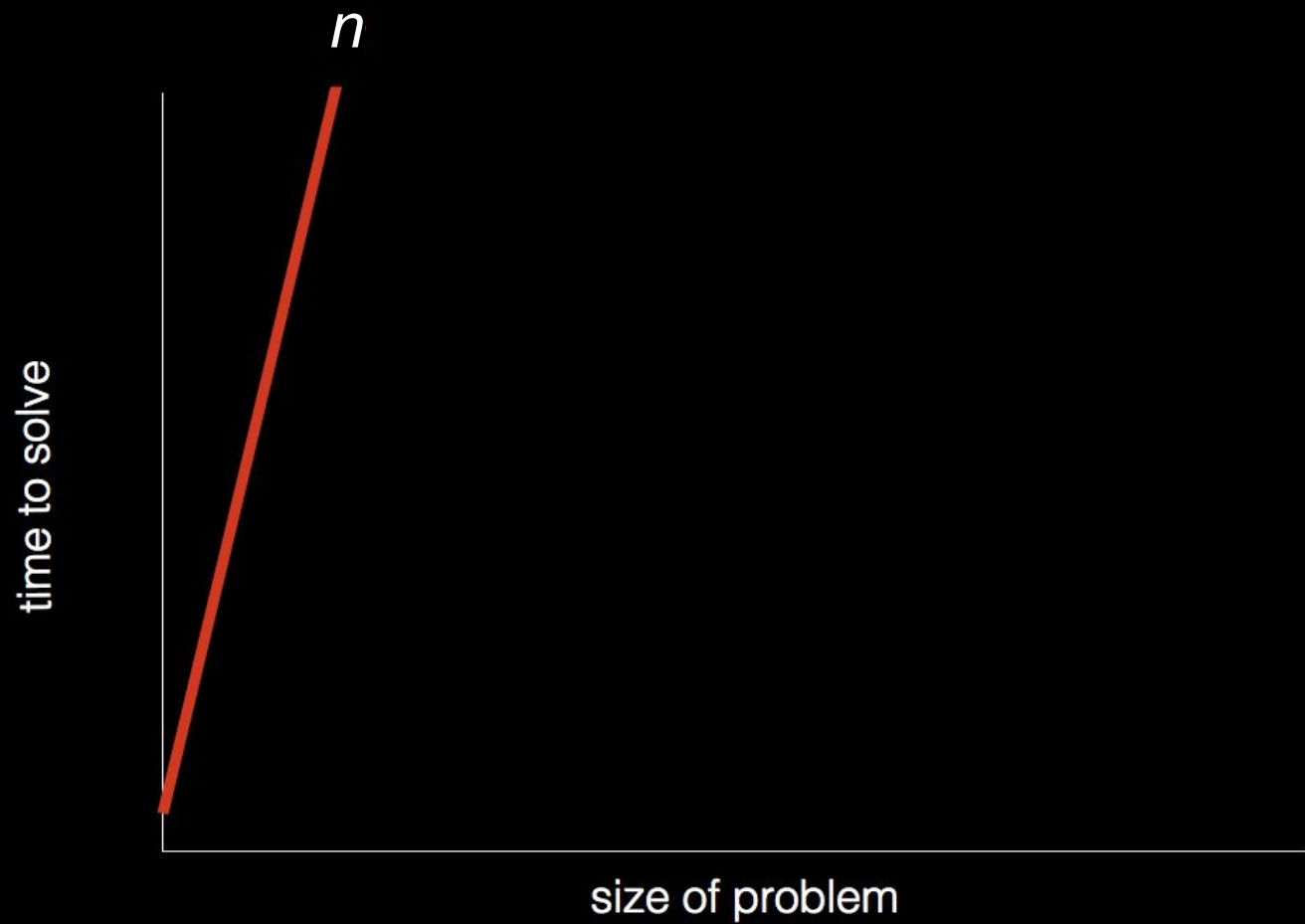
mobile

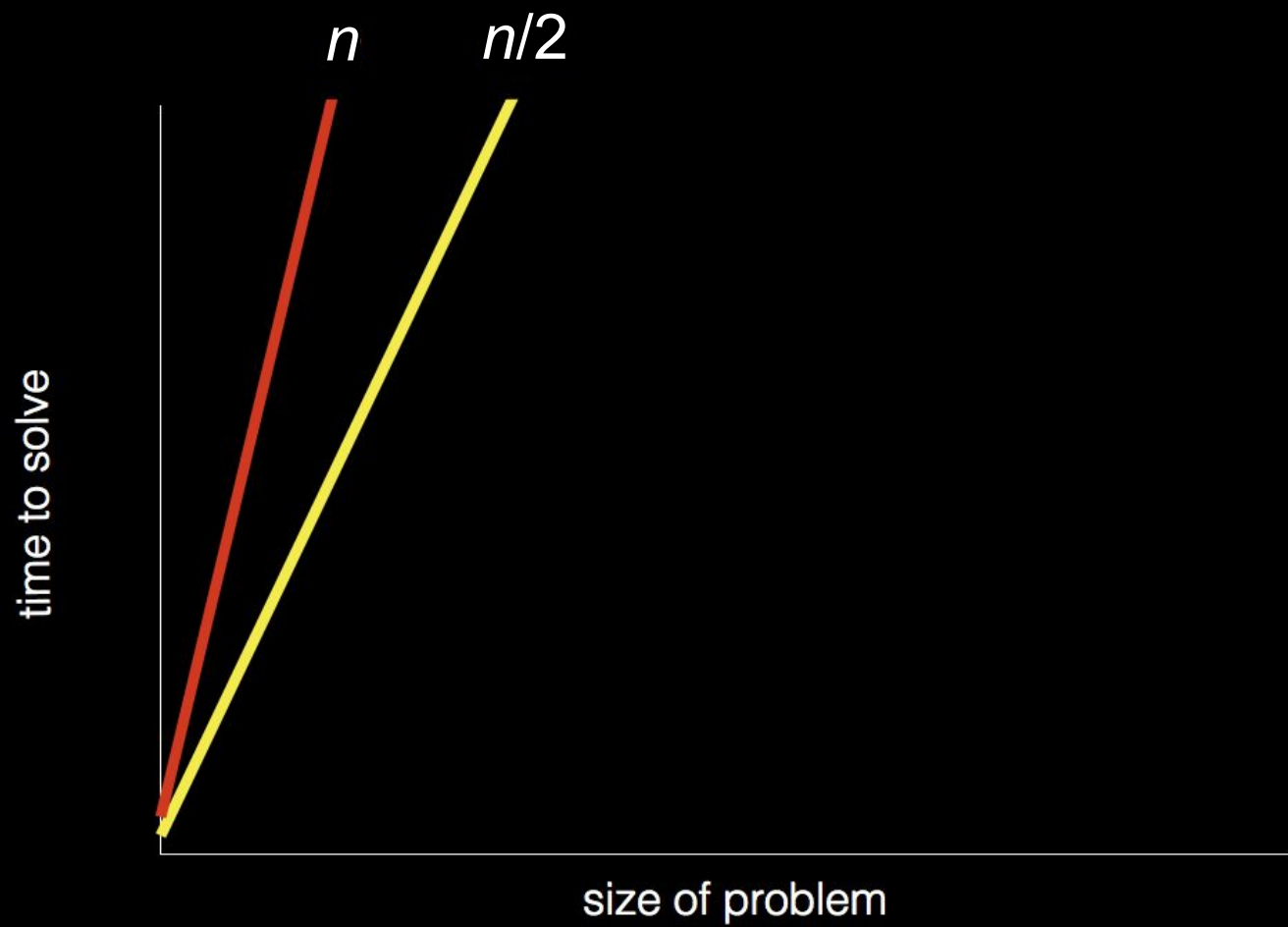
+1 (949) 468-2750

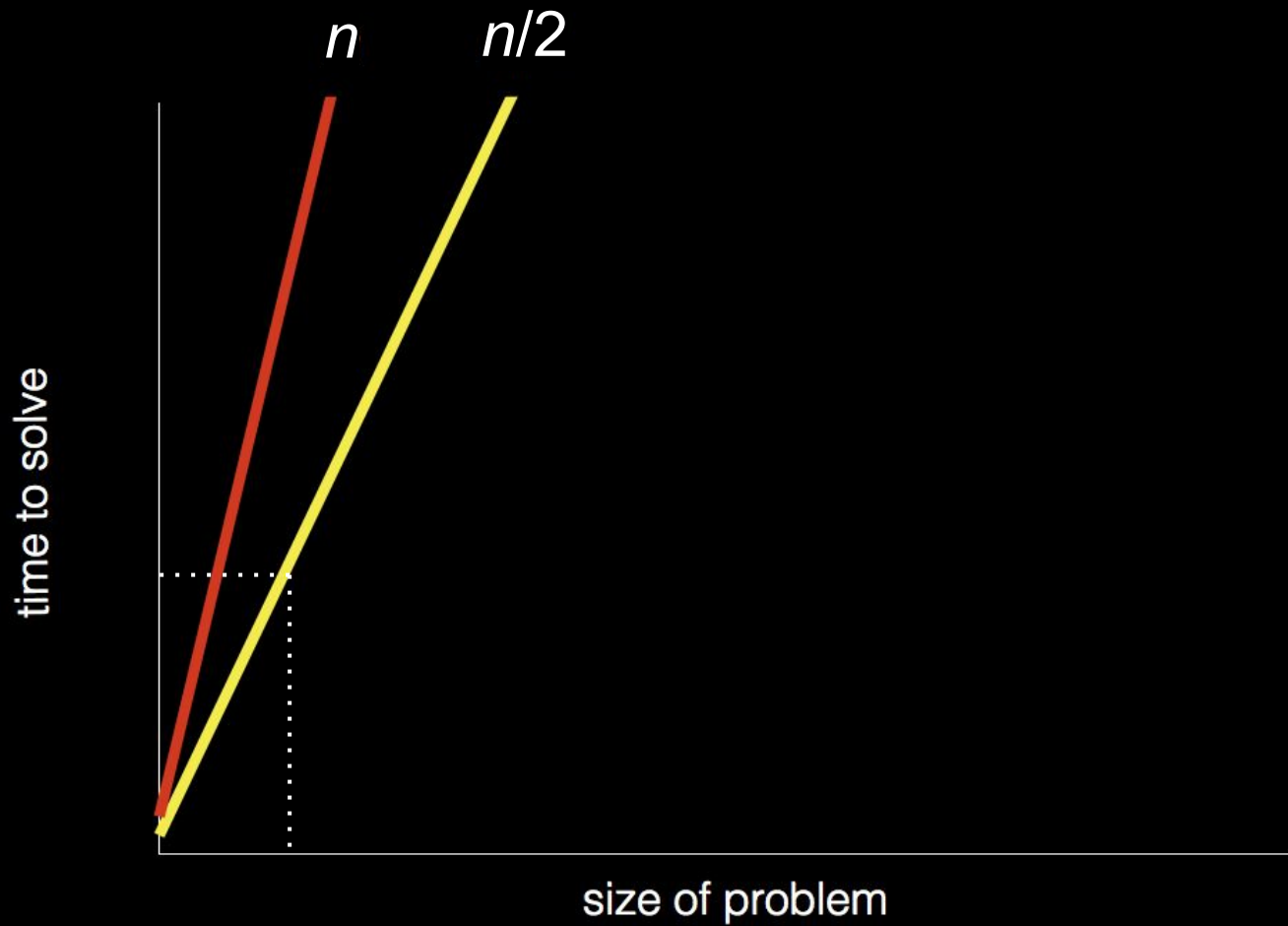
time to solve

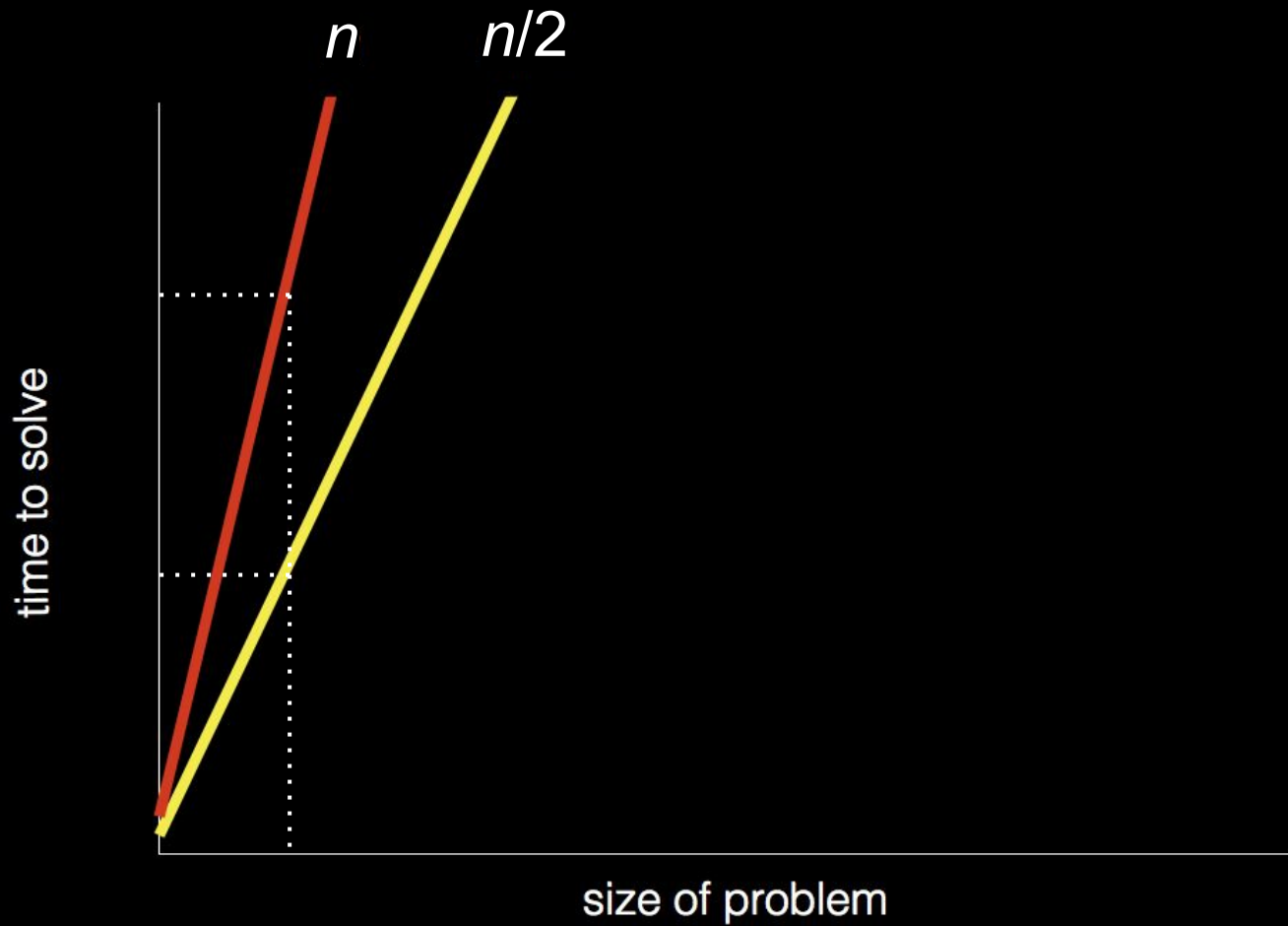
size of problem

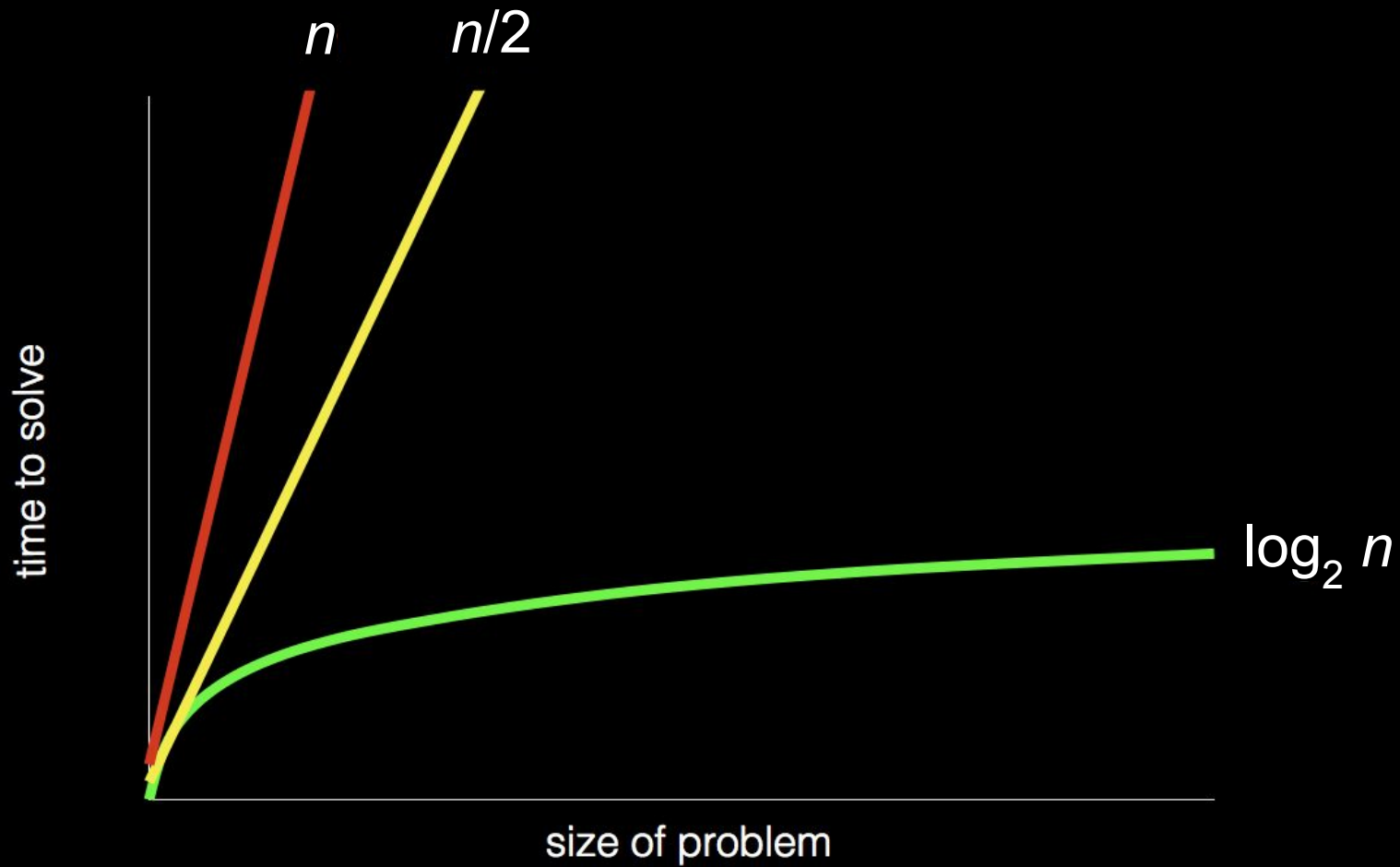












pseudocode

```
1  Pick up phone book
2  Open to middle of phone book
3  Look at page
4  If person is on page
5      Call person
6  Else if person is earlier in book
7      Open to middle of left half of book
8      Go back to line 3
9  Else if person is later in book
10     Open to middle of right half of book
11     Go back to line 3
12 Else
13     Quit
```

```
1  Pick up phone book
2  Open to middle of phone book
3  Look at page
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7      Open to middle of left half of book
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9  Else if person is later in book
10     Open to middle of right half of book
11     Go back to line 3
12 Else
13     Quit
```

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1  Pick up phone book
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```

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```

```
1  Pick up phone book
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9  Else if person is later in book
10     Open to middle of right half of book
11     Go back to line 3
12 Else
13     Quit
```

- functions
 - arguments, return values
- conditionals
- Boolean expressions
- loops
- variables
- ...

[illegible]

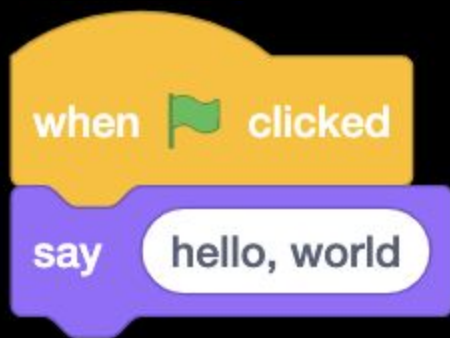

```
#include <stdio.h>
```

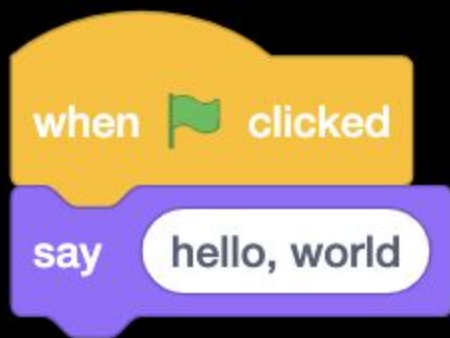
```
int main(void)
```

```
{
```

```
    printf("hello, world\n");
```

```
}
```





Scratch

scratch.mit.edu

Code

Costumes

Sounds



Motion



Looks



Sound



Events



Control



Sensing



Operators



Variables



My Blocks

Motion

move 10 steps

turn 15 degrees

turn 15 degrees

go to random position

go to x: 0 y: 0

glide 1 secs to random position

glide 1 secs to x: 0 y: 0

point in direction 90

point towards mouse-pointer

change x by 10

set x to 0

change y by 10

set y to 0

if on edge, bounce



Sprite

Sprite1

x 0

y 0

Show



Size

100

Direction

90



Sprite1

Stage

Backdrops

1





Code

Costumes

Sounds



Motion

Looks

Sound

Events

Control

Sensing

Operators

Variables

My Blocks

Motion

move 10 steps

turn 15 degrees

turn 15 degrees

go to random position

go to x: 0 y: 0

glide 1 secs to random position

glide 1 secs to x: 0 y: 0

point in direction 90

point towards mouse-pointer

change x by 10

set x to 0

change y by 10

set y to 0

if on edge, bounce



Sprite Sprite1

x 0

y 0

Show



Size 100

Direction 90



Sprite1

Stage

Backdrops

1

Motion



Sprite Sprite1

 $\longleftrightarrow x \quad 0$
$$\mathbb{I}_y \left(\begin{array}{c} 0 \\ 0 \end{array} \right)$$

Stage

Code

Costumes

Sounds

Motion

Looks

Sound

Events

Control

Sensing

Operators

Variables

My Blocks

move 10 steps

turn 15 degrees

turn 15 degrees

go to random position

go to x: 0 y: 0

glide 1 secs to random position

glide 1 secs to x: 0 y: 0

point in direction 90

point towards mouse-pointer

change x by 10

set x to 0

change y by 10

set y to 0

if on edge, bounce

Sprite1

↔ x 0 ↑↓ y 0

Show Show Size 100 Direction 90

Sprite1

Stage

Backdrops 1

Code

Costumes

Sounds

Motion

Looks

Sound

Events

Control

Sensing

Operators

Variables

My Blocks

move10steps

turn15degrees

turn15degrees

go to random position

go to x: 0 y: 0

glide 1 secs to random position

glide 1 secs to x: 0 y: 0

point in direction 90

point towards mouse-pointer

change x by 10

set x to 0

change y by 10

set y to 0

if on edge, bounce

Scratch Cat

Zoom In

Zoom Out

Reset Stage

Scratch Cat

Zoom In

Zoom Out

Reset Stage

Sprite

Sprite1

x0y0

Show

Size100

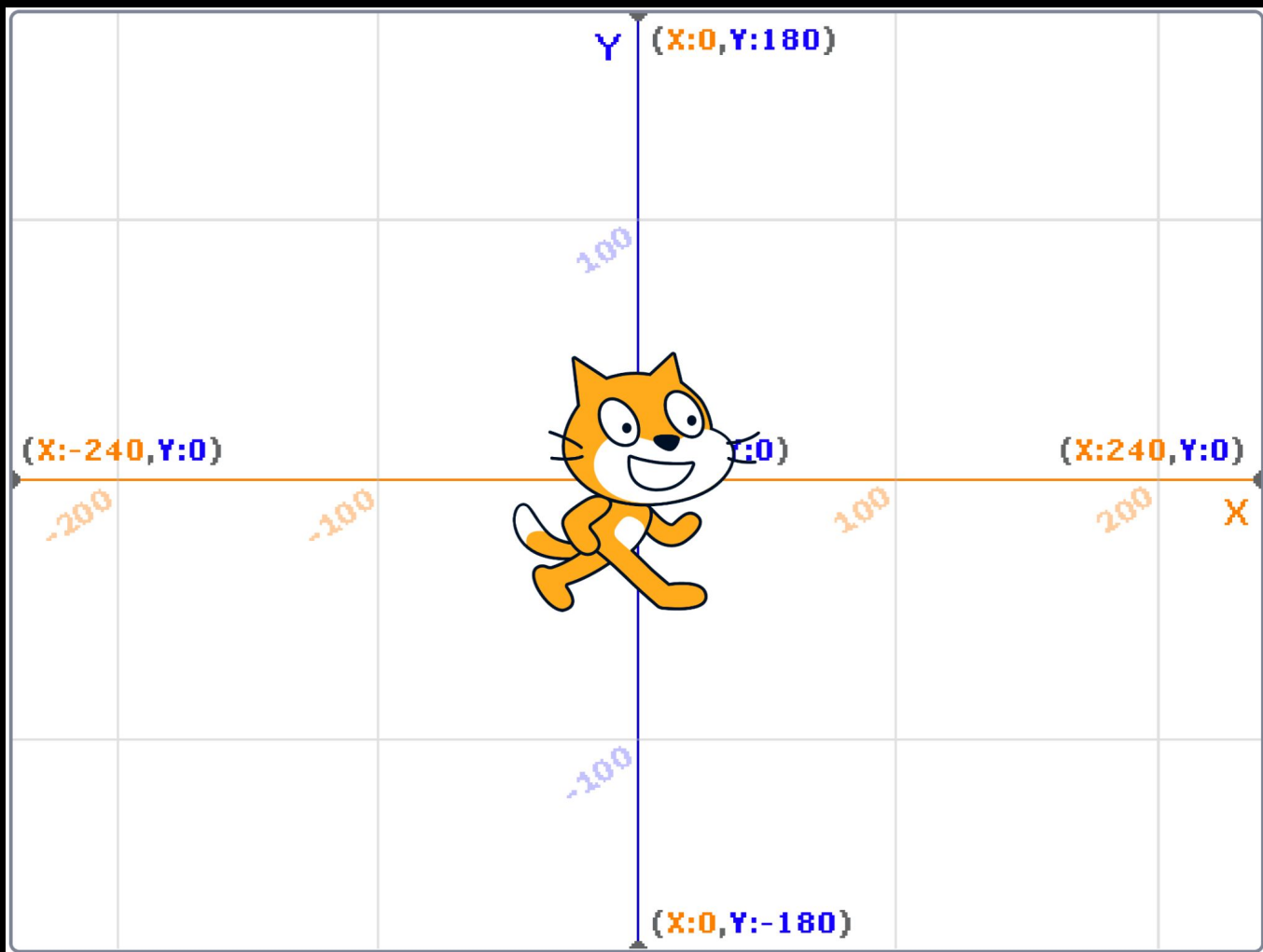
Direction90

Sprite1

Stage

Backdrops

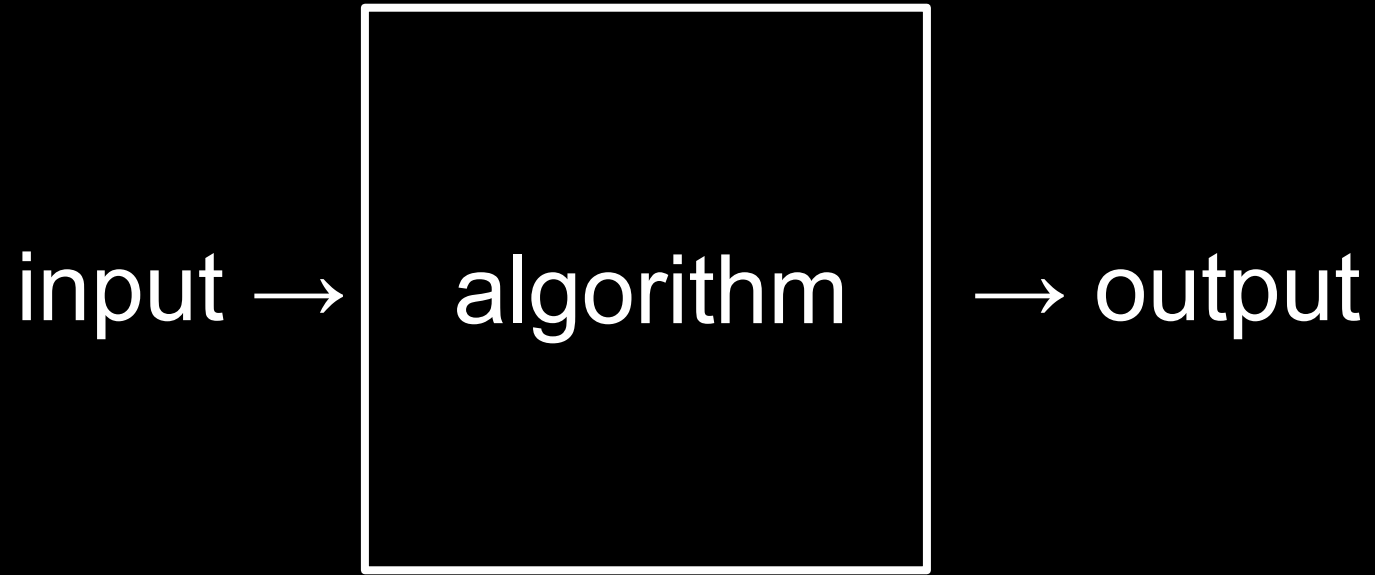
1



A purple Scratch 'say' block with a notch on the left and a bump on the right. It contains the text 'say' and 'hello, world' in a white rounded rectangle.

say

hello, world



hello, world

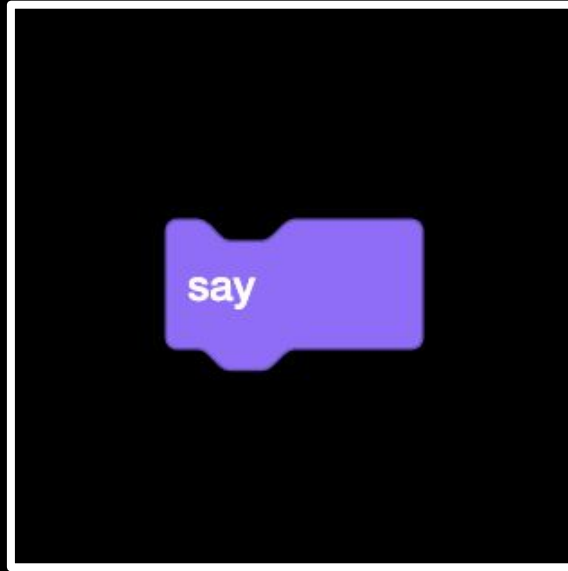


algorithm



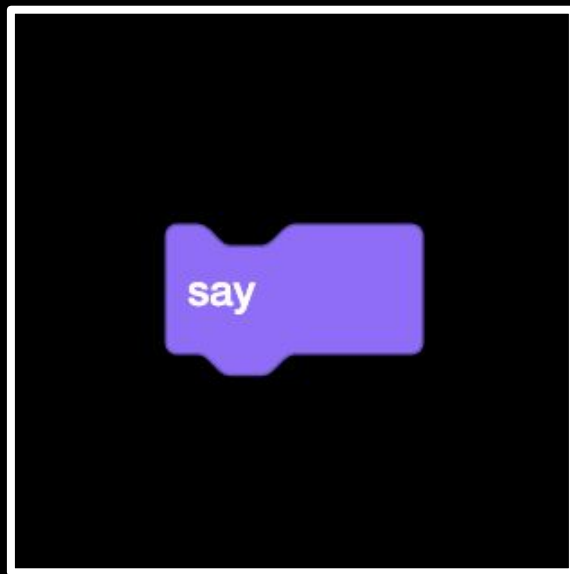
output

hello, world



→ output

hello, world

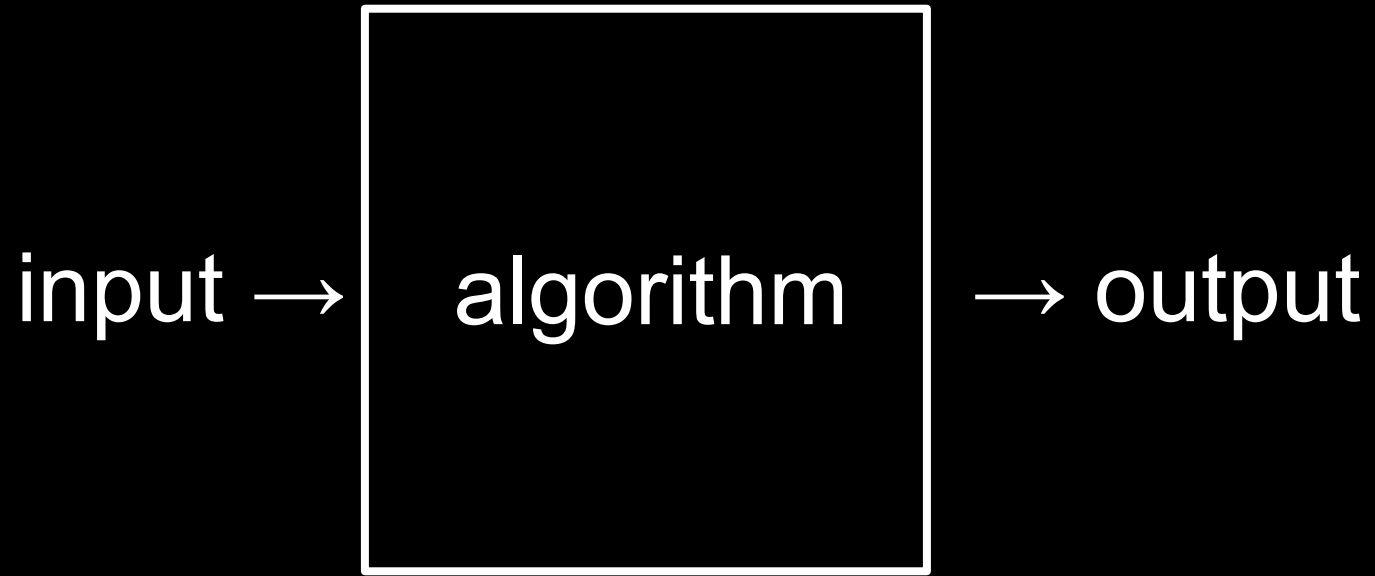


A blue Scratch 'ask and wait' block with a notch on the left and a bump on the right. It contains the text 'ask', 'What's your name?', and 'and wait'.

ask

What's your name?

and wait



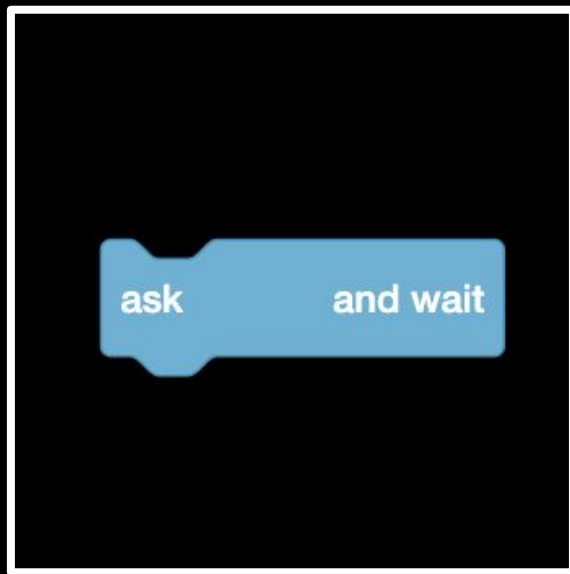
What's your name?



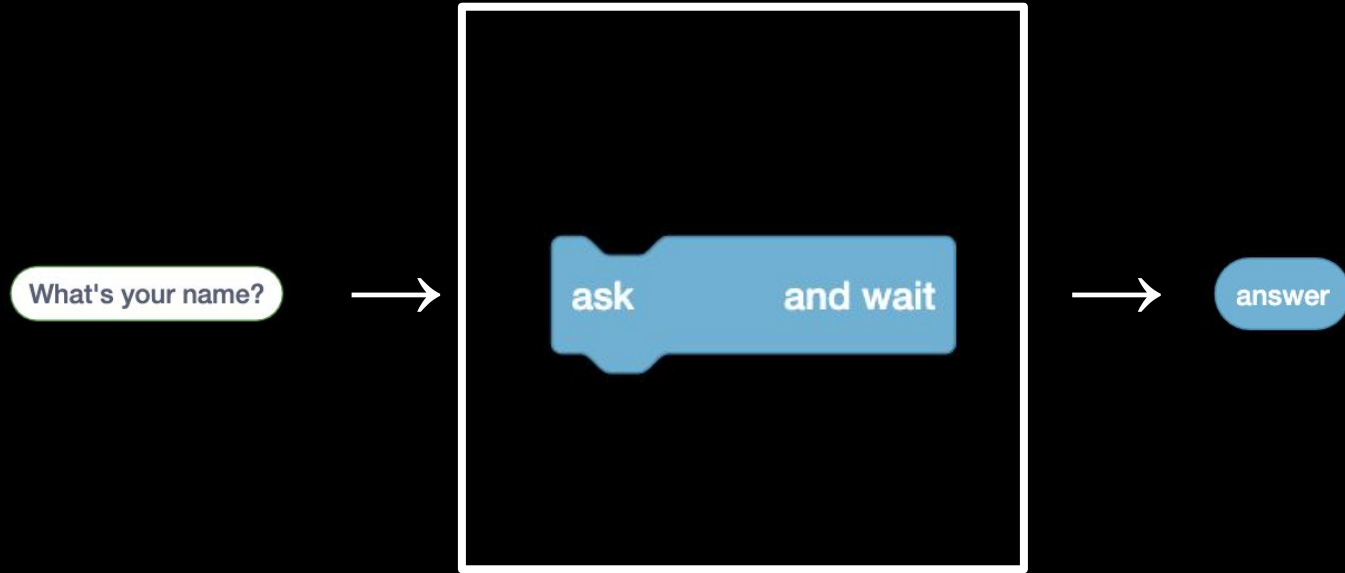
algorithm

→ output

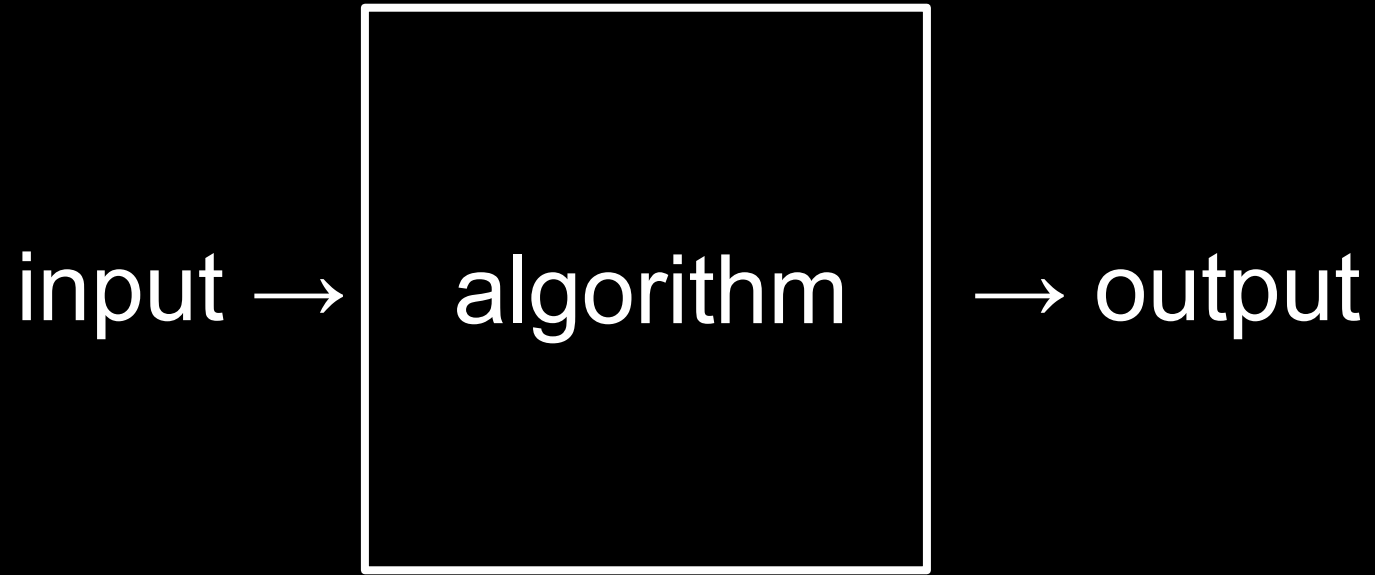
What's your name?



→ output

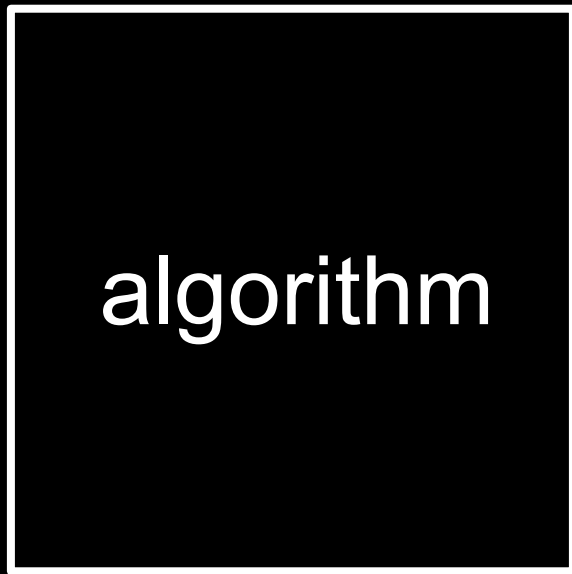




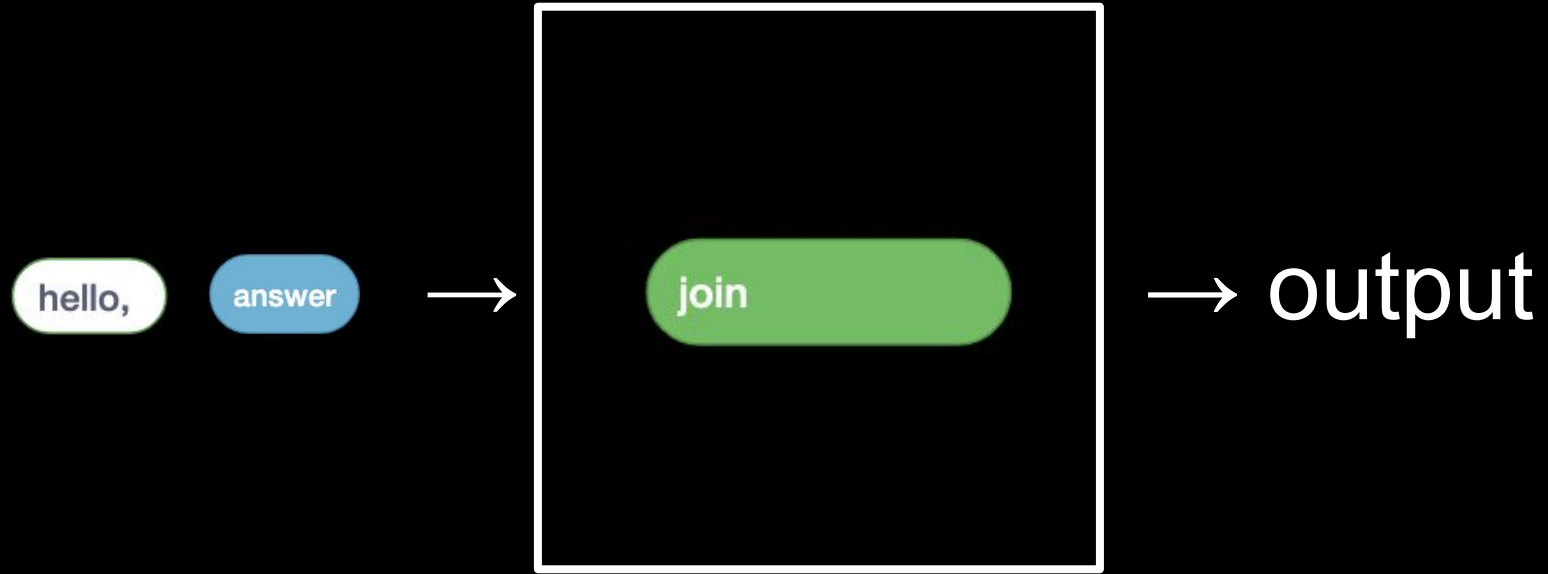


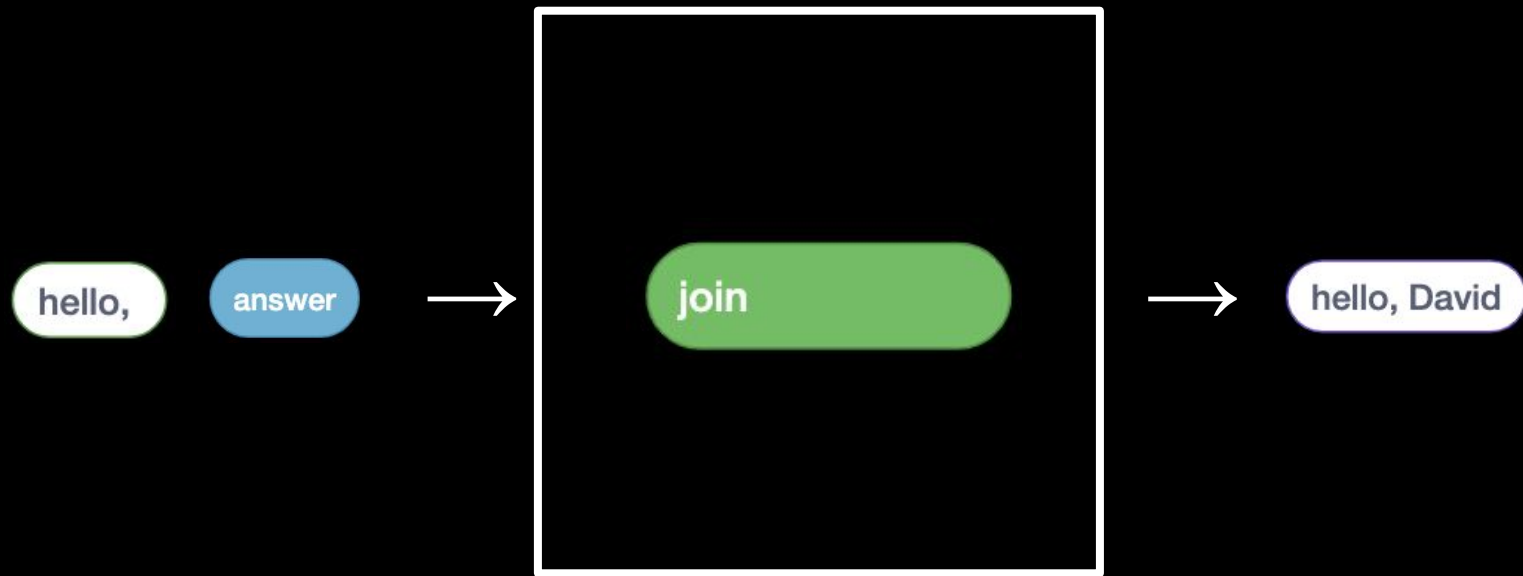
hello,

answer



output







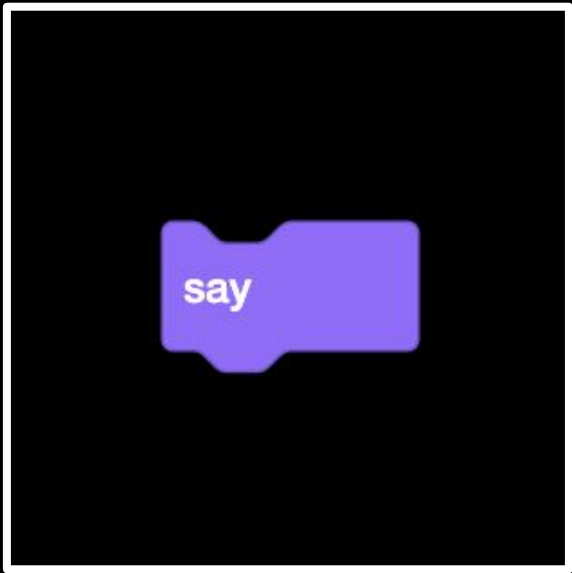
hello, David



hello, David



hello, David





hello, David



say



hello, David



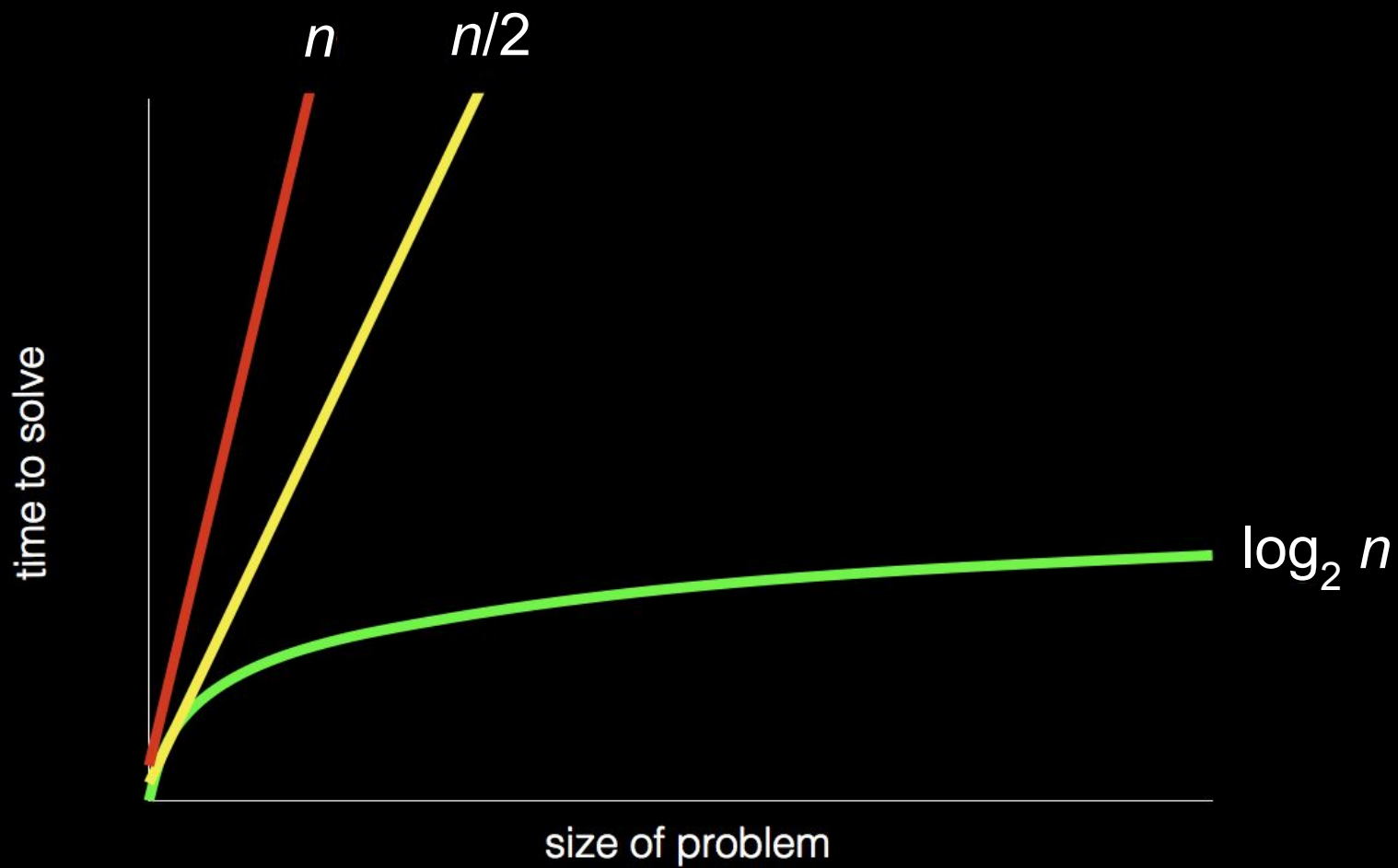
This is CS50

1. Stand up and think of the number 1.

1. Stand up and think of the number 1.
2. Pair off with someone standing, add their number to yours, and remember the sum.

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2. Pair off with someone standing, add their number to yours, and remember the sum.
3. One of you should then sit down.

1. Stand up and think of the number 1.
2. Pair off with someone standing, add their number to yours, and remember the sum.
3. One of you should then sit down.
4. If still standing, go back to step 2.



This is CS50